



# **A Roadmap for Commercializing Microgrids in California**

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California Energy Commission

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California Public Utilities Commission

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California Independent Systems Operator



## Purpose of the Microgrid Roadmap

- Identify the barriers and describe the actions necessary to facilitate commercialization of microgrids in California.
- Assess the regulatory, market, and technical barriers that may impede the widespread development of microgrids.
- Gather lessons learned from operational microgrids.
- Identify common use cases and a business case for microgrids.
- Identify the actions that the Energy Commission, CPUC, California ISO and others can take to enable greater development of microgrids in California.



## Agenda

9:30	Opening Comments Energy Commission CPUC CAISO	Mike Gravely Gabe Petlin Peter Klauer
10:00	Recap of the Earlier Microgrid Workshops	Mike Gravely
10:15	New Energy Commission Microgrid research effort	Peter Asmus Navigant
10:35	Open Discussion	All



## Agenda

11:00am Break into Three Separate Working Group Sessions  
(note, separate WebEx and Phone line connections  
will be available for each session):

Track 1 Financial – Moderator:	Costs and Benefits Peter Klauer, CA ISO
Track 2 Regulatory – Moderator:	Opportunities and Challenges Gabe Petlin, CPUC
Track 3 Technical – Moderator:	Opportunities and Challenges Mike Gravely, CEC



## Agenda

2:00pm     Three Separate Working Groups return to Plenary Session

Each separate working group will provide a summary of issues discussed and recommend actions that need to be addressed in the roadmap

Recommended next steps for each separate group

3:30pm     Open Discussion     All

3:50pm     Review Draft Microgrid Survey     Jeff Root  
Ecotech

4:00pm     Overview of the format for the Roadmap     Mike Gravely

4:15pm     Discuss Next Step and Schedule for  
Fourth Workshop in Late June/early July     Mike Gravely

4:30pm     Adjourn     All



## Recap of Previous Microgrid Workshops

- March 6, 2015 - Staff Workshop on Microgrid Assessment and Recommended Future RD&D investments.
- May 24, 2016 - Joint Energy Agency Workshop to Kick-Off the Development of a Roadmap to Commercialize Microgrids in California.
- September 6, 2016 - Staff Workshop Microgrids—Why are Customers Choosing Microgrids and How are they Working?



# Recap of Previous Microgrid Workshops

## Key Takeaways from Previous Work:

- Microgrids have Huge Potential
- Difficult to Develop Clear Business Case
- Need Clarifications on How Microgrids Best Fit
- Ownership Models
- Grant and Incentive Funding
- Need Clear Benefits and Value Streams
  - How do you value Reliability, Resilience, Social Value, etc.
  - Need to open more markets or service opportunities
- Need Government or Regulatory Guidance



# **CEC Work Authorization Supporting the Development of the Roadmap for Commercializing Microgrids in California**

**Peter Asmus**  
**Navigant**



# Initial Topics for Breakout Sessions

## Track 1 Financial – Costs and Benefits

- Participating in CA ISO Wholesale markets
  - Telemetry Equipment Requirements
  - Revenue Quality Data
  - Current Activities in this area
- Participating in DR Services
  - Telemetry Equipment Requirements
  - Revenue Quality Data
  - Current Activities in this area
- Participating in Other Available Revenue Opportunities
- Other value streams that have definable value
  - Peak Load Reductions
  - Providing Volt/VAR Services
  - Special EV/PEV Services
- Other Issues
  - Standards
  - Ownership
  - DER Integration Opportunities
  - Grant and incentive options
  - Coordinating the T/D interface operations for DER participating in the ISO
  - Rules/policy around LSE obligations of DER/Microgrids participating in the wholesale market (Resource Adequacy, reserves obligations, forecasting)
  - Rules/policy around retail/wholesale rates for DER loads (battery charging/station power)



# Initial Topics for Breakout Sessions

## Track 2 Regulatory – Opportunities and Challenges

- Regulatory Structure for Microgrids
  - Utility, End Customer or 3<sup>rd</sup> Party Ownership Models
  - Lack of Policies or Procedures
  - Current Rulemakings and Working Groups in this area
- Retail Tariff Options
  - Limitations of Existing Tariffs
  - New Options being Considered
- Interconnection Processes and Guidance
  - Current capabilities and limitations
  - Possible new options
  - Key outstanding issues
- Methods to Measure Value and Benefits
  - Location Net Benefits Analysis and Role of Microgrids
  - Integrated Capacity Analysis and Role of Microgrids
  - Other opportunities
- Other Issues
  - Standards
  - DER Integration Opportunities
  - Grant and incentive options



# Initial Topics for Breakout Sessions

## Track 3 Technical – Opportunities and Challenges

- Key Technical Issues
  - Clarity of Roles of Microgrids
  - Interconnection Equipment Costs
    - Metering
    - Telemetry
    - Data Requirements
- Ownership Challenges
  - Microgrid Configuration
  - Risk Profiles
  - Standard Equipment Suites
  - Standards
- Integration of DER
  - Lack of Proven History for Emerging DER
  - Equipment Payment Options
  - Incentive or Grant Options
  - Other
- Methods to Measure Value and Benefits
  - Location Net Benefits Analysis and Role of Microgrids
  - Integrated Capacity Analysis and Role of Microgrids
  - Other opportunities
- Other Issues
  - Standards
  - Other Grant and Incentive Options



## Agenda

2:00pm Three Separate Working Groups return to Plenary Session

Track 1 Financial – Costs and Benefits  
Moderator: Peter Klauer, CA ISO

Track 2 Regulatory – Opportunities and Challenges  
Moderator: Gabe Petlin, CPUC

Track 3 Technical – Opportunities and Challenges  
Moderator: Mike Gravely, CEC



## Agenda

3:50pm	Review Draft Microgrid Survey	Jeff Root Ecotech
4:00pm	Overview of the format for the Roadmap	Mike Gravely
4:15pm	Discuss Next Step and Schedule for Fourth Workshop in Late June/early July	Mike Gravely
4:30pm	Adjourn	All



## Overview of the format for the Roadmap



The roadmap identifies actions to address the three categories of challenges described above. The venue for each action was also identified along with an assigned priority. The team organized the actions into five topic areas: planning, procurement, rate treatment, interconnection, and market participation.<sup>9</sup> The following table contains the highest priority actions by topic area.

### Energy Storage Roadmap: highest priority actions

Planning	<b>CPUC</b> Describe distribution grid operational needs and required resources characteristics.	<b>CPUC</b> Facilitate clarification by IOUs of operational constraints that can limit the ability to accommodate interconnection on the distribution system.	<b>CPUC</b> Examine and clarify opportunities for storage to defer or displace distribution upgrades.
Procurement	<b>CPUC &amp; Energy Commission</b> Consider refinements to the valuation methodologies used by IOUs to support CPUC decisions on storage procurement and make models publicly available.	<b>CPUC</b> Clarify rules for energy storage qualification and counting in an evolving Resource Adequacy (RA) framework.	<b>CPUC</b> Consider "unbundling" flexible capacity RA counting.
Rate treatment	<b>ISO</b> Clarify wholesale rate treatment and ensure that the ISO tariff and applicable business practices manuals and other documentation provide sufficient information.	<b>CPUC</b> Clarify and potentially modify net energy metering tariffs applicable to cases where energy storage is paired with renewable generators.	

<sup>9</sup> The appendix provides a table that organized actions according to the category of challenge it addresses.



# Overview of the format for the Roadmap

The IOUs are currently developing Distribution Resource Plans as directed by the CPUC to fulfill a requirement of Assembly Bill 327.<sup>11</sup> These plans will identify the optimal locations for distributed energy resources, including energy storage, on the distribution system. A working group called "More than Smart" is a companion effort to the CPUC proceeding to facilitate technical discussions and includes topics outside the current proceeding. One such topic is

the need to define coordination between utility and ISO planning. This will ensure that assumptions made in the transmission planning process of the types, amounts, and locations of distributed energy resources are included in distribution planning. Conversely, as resources begin to materialize on the distribution system, assumptions in transmission planning can be adjusted.

## Planning action items

1 Describe distribution grid operational needs and required resources characteristics.	CPUC	High
2 Facilitate clarification by IOUs of operational constraints that can limit the ability to accommodate interconnection on the distribution system.	CPUC	High
3 Examine and clarify opportunities for storage to defer or displace distribution upgrades.	CPUC	High
4 Describe ISO grid operational needs and required resource characteristics.	ISO	Medium
5 Develop coordination process for transmission and distribution system planning.	CPUC, ISO	Medium
6 Clarify assessment of energy storage resources classified as transmission assets to defer or displace transmission upgrades.	ISO	Low

## Procurement

Several stakeholders expressed the need for a common methodology and tools for evaluating storage for use by utilities and the CPUC in making procurement decisions. In its 2013 decision on storage, the CPUC identified several areas of value that should be considered in the IOU procurement filings.<sup>12</sup> The decision also identified available tools to support valuation but stopped short of defining a specific methodology or tool to be used in future storage procurement cycles. In the decision, the CPUC concluded that each "utility should be allowed to propose its own methodology to evaluate the costs and benefits of bids and evaluate the full range of benefits and costs identified for energy storage in the use-case." The decision further acknowledged that this approach gives IOUs wide latitude to use proprietary protocols for actual project selection.

Under the Public Interest Energy Research (PIER) program, the Energy Commission funded research and development of storage evaluation tools and methodologies to address at least some of the needs in determining the value of storage for the California grid and for energy storage developers. Similarly, under the EPIC program, the Energy Commission also aims to fund the development of storage valuation methodologies and tools with the purpose of making such tools and methodologies transparent and publicly available.

This valuation includes defining products and services that can provide revenue to energy storage and other flexible resources suppliers. These products and services need to be grounded in the operational needs of the transmission and distribution systems. That means clearly defining grid

<sup>11</sup> Public Utilities Code Section 769 was instituted by Assembly Bill 327, Sec. 8 (Perez, 2013). This new code section requires the electrical corporations to file distribution resources plan proposals by July 1, 2015. According to the Code, these plan proposals will "identify optimal locations for the deployment of distributed resources." It defines "distributed energy resources" as "distributed renewable generation resources, energy efficiency, energy storage, electric vehicles, and demand response technologies." The Code also requires the CPUC to "review each distribution resources plan proposal submitted by an electrical corporation and approve, or modify and approve, a distribution resources plan for the corporation. The commission may modify any plan as appropriate to minimize overall system costs and maximize ratepayer benefit from investments in distributed resources." Pursuant to Section 769, the CPUC instituted a rulemaking on August 13, 2014 (R. 14-08-013).

<sup>12</sup> CPUC energy storage proceeding R. 10-12-007, Decision D. 13-10-040



## Overview of the format for the Roadmap

### Activities for the Develop Enabling Policies Track

The following table captures key activities under this track.

Goal	Activities
Ensure coherence between state policies, programs and national standards	Identify process interaction and dependencies Identify and implement adjustments to existing processes, or establish processes for coordination
Define VGI-related products and programs	Define VGI eligible utility programs Define VGI eligible wholesale market products
Define VGI program or product eligibility	Specify definition for VGI resources participating in ISO regulation market, accounting for "Pay for Performance" Review DR market rules and define participating VGI resources Define other or additional products and programs for VGI Establish metrics for success
Clarify VGI-related product and program requirements	Specify interconnection rules Specify telemetry and metering requirements Specify communication requirements
Clarify settlement	Define billing processes, incorporate lessons learned from PEV subtractive billing pilots Define enrollment processes and eligibility Define penalties and payment mechanisms
Define verification and conflict resolution protocols	Review and define conflict resolution processes specific to VGI Review and define verification processes specific to VGI
Define signals and messaging	Define charging and discharging signals by product and program
Research, development and demonstration (RD&D)	Coordinate existing RD&D and ensure results are published for public consumption Identify additional research gap for further study and scale pilots as needed

### Ensure Coherence between State Policies, Programs and National Standards

Goal: create a coordinated approach to VGI activities.

The VGI Roadmap is being developed within the context of an evolving electricity system in the state. As Appendices B and D illustrate, several state, national and international policy initiatives are underway which will shape the role of distributed energy resources in California and will define characteristics of EVs and EVSE. Given the relevancy of VGI with these other initiatives, and given the number of entities working on VGI within California, it is critical that VGI activities be coordinated. One example noted by stakeholders is the policy issue of net metering. Stakeholders pointed to the popularity of netmetered solar PV and EV ownership, and sought to clarify the interaction of VGI providing grid services with netmetering tariffs. Close coordination among utilities

and the CPUC will help identify the requirements and allowance of netmetering tariffs for various combinations of EV and PV grid interconnection and usage. In addition, the CPUC's rulemaking on Alternative Fueled Vehicle Programs, Tariffs and Policies (R.13-11-007) will guide many activities in support of this VGI Roadmap.

### Define VGI Products, Programs, and Eligibility

Goal: identify those grid services for which VGI can be compensated.

Although grid services products and programs do not exclude EVs' participation, they do not explicitly define requirements for their participation either. Activities under this track entail reviewing and revising the rules for current products and programs, or developing new ones depending on VGI capabilities and market needs. For example, in the CPUC October decision supporting the implementation of



## Planning For Next Workshop

- Review Comments and Recommendations from Attendees to the April 25, 2017 Workshop
- Establish the Technical Advisory Committee
- Expand the email list of Interested Parties
- Complete Microgrid Survey
- Summarize Key Next Steps from Comments and TAC Meeting
- Host June/July Workshop



<http://www.energy.ca.gov/contracts/epic.html>

Anticipated Solicitations			
Solicitation Title	Release Date	Program Area/Strategic Objective	Estimated Funding Amount
Improving Performance and Cost Effectiveness of Wind Energy Technologies	Mar. 2017 – Apr. 2017	Applied Research and Development (S4)	\$2.5 million
Demonstrating the Commercial Business Case for Microgrids that Supports California's Aggressive Energy and GHG Reduction Policies and Integrates New and Emerging Technologies	Apr. 2017 – Jun. 2017	Technology Demonstration and Deployment (S15.1)	\$40 million
Existing Building Research, Development and Demonstration Program	Aug. 2017 – Oct. 2017	Applied Research and Development (S1) Technology Demonstration and Deployment (S12)	\$20 million



<http://www.energy.ca.gov/research/microgrid/>

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Photo: Wireless Lighting Controls at Pleasanton Library. Courtesy of Energy Solutions

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## California Microgrid Roadmap

California Energy Commission staff in collaboration with the California Public Utilities Commission and the California Independent System Operator are developing a Roadmap for the Commercialization of Microgrids in California. This Roadmap will be finalized by the end of 2017. This web page will contain the interim documents, information of future activities and the Draft Roadmap once available for review. This web page will be routinely updated as new items are completed and future workshops are held.

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### Road Mapping Information

- Workshops, Notices and Documents
- Next Workshop: April 25, 2017**  
9:30 a.m. to 4:30 p.m.  
The US Grant Hotel  
326 Broadway  
San Diego, California 92101

### Related Information

- Microgrid Assessment and Recommendation(s) to guide Future Investments - Kema Report (PDF File)
- California's Energy Storage Roadmap (PDF File)
- California Vehicle-Grid Integration (VGI) Roadmap

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## Written Comments

**(Due by 5 pm, May 9, 2017)**

- Please use **electronic commenting system** for submitting written comments and complete the form provided on the EPIC docket webpage at:

**<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=16-EPIC-01>**

- All written comments will become part of the public record of this proceeding.
- You may also include general comments in the box titled "Comment Text" or attach a file with your comments. Attached comments must be in a Microsoft® Word (.doc, .docx) or Adobe® Acrobat® (.pdf) formatted file.
- Written comments may also be submitted **by e-mailing** them to the Dockets Office, or **by U.S. Mail** to:

California Energy Commission  
Dockets Office, MS-4  
Re: Docket No. 16-EPIC-01  
1516 Ninth Street, Sacramento, CA 95814-5512

- If you choose not to use the electronic filing system, please **include the docket number 16-EPIC-01 on any e-mailed or written comments**. Comments may be e-mailed to **[docket@energy.ca.gov](mailto:docket@energy.ca.gov)**

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# Questions